TECHNICAL REPORT

Contract Title:	Infrared Algorithm Development for Ocean Observations with EOS/MODIS
Contract:	NAS5-31361
Type of Report:	Quarterly
Time Period:	January-March 1995
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INFRARED ALGORITHM DEVELOPMENT FOR OCEAN OBSERVATIONS WITH EOS/MODIS

Abstract

Efforts continue under this contract to develop algorithms for the computation of sea surface temperature (SST) from MODIS infrared retrievals. This effort includes radiative transfer modeling, comparison of *in situ* and satellite observations, development and evaluation of processing and networking methodologies for algorithm computation and data accession, evaluation of surface validation approaches for IR radiances, and participation in MODIS (project) related activities. Efforts in this contract period have focused on radiative transfer modeling and evaluation of atmospheric path radiance efforts on SST estimation, exploration of involvement in ongoing field studies, evaluation of new computer networking strategies, and objective analysis approaches.

MODIS INFRARED ALGORITHM DEVELOPMENT

A.   Near Term Objectives

A.1.   Continue algorithmic development efforts based on experimental match-up databases and radiative transfer models.

A.2.   Continue interaction with the MODIS Instrument Team through meetings and electronic communications.

A.3   Continue evaluation of different approaches for global SST data assimilation and work on statistically based objective analysis approaches.

A.4   Continue evaluation of high-speed network interconnection technologies.

A.5   Continue evaluation of various *in situ* validation instruments for the MODIS IR bands.

A.6   Provide investigator and staff support for the preceding items.

B.   Overview of Current Progress

B.1   January-March 1995

       Activities during the past three months have continued on the previously initiated tasks. There have been specific continuing efforts in the areas of (a) radiative transfer modeling, (b) generation of model based retrieval algorithms, (c) continued work on IR calibration/validation as part of the MODIS Ocean Science Team cruise effort, and (e) work on test and evaluation of an experimental wide area network based on ATM technology. Previously initiated activities such team related activities are ongoing.

B.1.1   Radiative Transfer Modeling

       Simulations were run to study methods of splitting the various parameter spaces to improve retrieval equation accuracy. A tentative set of slowly varying parametric fits seems to improve algorithm performance.

B.1.2   Algorithm Development Efforts Based on Experimental Match-up Data bases

       The main objective of our recent work is to explore the associations between atmospheric water vapor content and various AVHRR-derived quantities. Insight gained on the nature of these associations will allow us to better understand the performance of existing SST algorithms, as well as to improve the parameterization of various terms in such algorithms. The difference in brightness temperatures in AVHRR channels 4 and 5 is the quantity most often used as a proxy for atmospheric effects. Therefore, during this period we have dedicated considerable attention to exploring the association between this quantity and water vapor, including the effects of AVHRR viewing geometry, geographic location, and season. We are now validating a moving temporal window approach to retrieval equation generation. Testing over multi-year data sets demonstrates good accuracy (0.5K RMS)

B.1.3   Wide Area Networking

       Efforts to test experimental high speed network between FORE and <u>Digital</u> ATM switches at the University of Miami were successful in March. SVCs are being established routinely over these connections as appropriate. The network between heterogeneous machines, switches and adaptors (FORE, SGI and DEC) is being used in a production environment.

B.1.4   *In Situ* Calibration/Validation of MODIS IR Radiances

       Work was initiated during the previous six months to evaluate several new approaches to infrared radiance measurements cooperatively with Dr. William Smith of the University of Wisconsin. Specifically we have agreed to participate in a joint study utilizing the NASA ER-2 (MAS and HIS), GOES-8, and two shipboard mounted instruments (AERI and Heimann KT-19). The study occurred in early January, 1995 in the western Gulf of Mexico between frontal passages. Dr. Peter Minnett (Brookhaven National Laboratory) provided a portable surface meteorology package including long-wave downwelling (Eppley), and a fast response *in situ* temperature probe. Preliminary results demonstrate excellent surface radiance and temperature measurement and concomitant retrieval of SST.

C. Investigator Support

January	W. Baringer
	O. Brown
	A. Li
	S. Walsh
February	W. Baringer
	O. Brown
	A. Li
	S. Walsh
March	J. Brown
	O. Brown
	A. Koger
	A. Li
	S. Walsh

D. Future Activities

D.1   Current:

D.1.1   Algorithms

a.   Continue to develop and test algorithms on global retrievals
b.   Evaluation of global data assimilation statistics for SST fields
c.   Continue RT modeling using RAL code
d.   ATBD updates (as needed)
e.   Define and implement an extended ATM based network test bed
f.   Evaluate and analyze results of calibration/validation experiment
g.   Continued integration of new workstations into algorithm development environment

D.1.2   Investigator support

Continue current efforts

E. Problems

No new problems to report.